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## Chapter 4 – Fatigue Crack Initiation and Propagation

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### Abstract

The resistance of metal alloys to fatigue can be classified into four major regimes: low-cycle fatigue (or short life), limited resistance (between  $10^5$  and  $10^6$  cycles), high-cycle fatigue (between  $10^6$  and  $10^7$  cycles) and gigacycle (more than  $10^7$  cycles). This chapter introduces the basic concepts of cyclic mechanical behavior, crack initiation and propagation in these different regimes.

### Keywords

Crack path ; Fatigue Crack Initiation ; Fatigue crack propagation ; Gigacycle fatigue ; High-cycle fatigue tests ; Interaction between modes ; Mixed-mode fatigue crack growth ; Multiaxial fatigue ; Plastic or low-cycle fatigue tests

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